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**Project name:**  
2019 Delaware River PFAS Characterization  
Chemours Chambers Works Site

**Project ref:**  
60585876

**From:**  
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**Date:**  
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**CC:**  
Helen Dudar, NJDEP  
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## Memo

**Subject:** 2019 Delaware River PFAS Characterization – Data Report Memorandum  
Chemours Chambers Works Complex, Deepwater, New Jersey

### Background

This memorandum summarizes field investigation activities completed by AECOM on behalf of the Chemours Company on March 27-29, 2019. The sampling program was conducted in response to requests made by the U.S. Environmental Protection Agency (EPA) and the New Jersey Department of Environmental Protection (NJDEP) in a letter to Chemours received on April 13, 2018. The objective of this investigation was to determine the concentration of hexafluoro-propylene oxide dimer acid (HFPO-DA) and select per- and poly-fluoroalkyl substances (PFAS) in Delaware River surface water.

### Sampling Methodology

Field sampling activities were conducted in accordance with the *EPA Requested Delaware River Sampling for HFPO-DA and PFAS* sampling plan originally submitted to the EPA in a letter dated September 26, 2018, including subsequent revisions as described in response to comment letters to the EPA dated October 23, 2018 and March 12, 2019. Near-surface (i.e., 0 to 2-foot depth) surface-water grab samples were collected at 22 locations (see Figure 1) using a weighted bottle sampler. Surface-water samples at depth were collected within the bottom one-third of the water column at locations upstream [Christina-Riv-(RM-70.6)] and downstream [Del-MB-(RM-68.9)] of the Chambers Works outfall using a peristaltic pump and dedicated tubing. Samples were collected during the last two hours of the falling tide through the slack low tide. Delaware River surface water flows at the time of sampling were at or below the historical median daily flow for the dates sampled (see Figure 2).

Water quality parameters were collected at three depths across the water column at each sample location using a Yellow Springs Instruments 6820 water quality meter. Parameters measured included the following: temperature, pH, dissolved oxygen, oxidation reduction potential (ORP), specific conductance, and turbidity. A summary of field water quality parameters is provided in Table 1.

## Sample Analysis and Results

Samples were shipped via overnight courier under chain-of-custody to TestAmerica Denver for HFPO-DA and PFAS analysis by EPA Method 537 Modified. HFPO-DA was detected in a single sample [Salem-Riv-(RM-58.7)] near the confluence of the Salem River at the method detection limit of 0.004 micrograms per liter ( $\mu\text{g/L}$ ). HFPO-DA was not detected above the method detection limit in any other samples. A summary of analytical results is provided in the attached Table 2 and Figure 3.

## Comparison to DRBC Results

The Delaware River Basin Commission (DRBC) has been monitoring contaminants of emerging concern within the Delaware River and its tributaries. As part of these programs, the DRBC has collected surface-water samples for PFAS analysis from six stations in the Delaware River in 2007, 2008, and 2009, and 15 stations were sampled in 2015<sup>1</sup>. Based on these events, PFAS were detected within the Delaware River during each event starting in 2007. However, by 2015, the concentrations for all detected PFAS compounds had noticeably declined (see Figure 4). As part of its 2019 sampling program, Chemours included seven sample stations that are coincident with those sampled by the DRBC. Sampling at these stations confirmed the detection of selected PFAS compounds reported within the DRBC dataset and also indicated that concentrations are continuing to decline since the DRBC 2015 sample event.

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<sup>1</sup> From: Contaminants of Emerging Concern in the Delaware River Basin. Ron MacGillivray, Ph.D. Senior Environmental Toxicologist. CCNJ Spring Conference. May 3, 2016.

## Tables

**Table 1**  
**Summary of Analytical Results in Surface Water**  
**Delaware River HFPO-DA and PFAS Characterization**  
**Perfluorinated Compounds**  
**Chemours Chambers Works Complex**  
**Deepwater, New Jersey**

| Parameter Name                                  | Units | Location ID<br>Sample Date | Reedy-Island<br>(RM 54.9)<br>03/27/2019 | C_D-Canal<br>(RM-58.7)<br>03/27/2019 | Salem-Riv<br>(RM-58.7)<br>03/27/2019 | Pea-Patch-<br>Island<br>(RM 60.6)<br>03/27/2019 | New-Castle<br>(RM 66.0)<br>03/27/2019 | Del-MB<br>(RM-68.9)<br>03/28/2019 | Del-MB-<br>Deep<br>(RM-68.9)<br>03/28/2019 | Cherry-<br>Island<br>(RM-71.0)<br>03/27/2019 | Christina-<br>Riv<br>(RM-70.6)<br>03/28/2019 |
|---|-------|----------------------------|---|--------------------------------------|--------------------------------------|---|---------------------------------------|-----------------------------------|--|--|--|
| <b>Perfluorinated Compounds</b>                 |       |                            |   |                                      |                                      |   |                                       |                                   |  |  |  |
| PFBS  | UG/L  |                            | <b>0.0022</b>                           | <b>0.0021</b>                        | <b>0.0023</b>                        | <b>0.0022</b>                                   | <b>0.0023</b>                         | <0.0020                           | <b>0.0021</b>                              | <0.0020                                      | <b>0.0022</b>                                |
| PFDA  | UG/L  |                            | <0.0020                                 | <b>0.0096 J</b>                      | <0.0020                              | <0.0020   | <0.0020                               | <0.0020                           | <0.0020                                    | <0.0020                                      | <b>0.002</b>                                 |
| PFDOA   | UG/L  |                            | <0.0020                                 | <b>0.0033</b>                        | <0.0020                              | <0.0020   | <0.0020                               | <0.0020                           | <0.0020                                    | <0.0020                                      | <0.0020                                      |
| PFHPA   | UG/L  |                            | <b>0.007</b>                            | <b>0.0068</b>                        | <b>0.0093</b>                        | <b>0.0085</b>                                   | <b>0.0044</b>                         | <b>0.0049</b>                     | <b>0.0042</b>                              | <b>0.0025</b>                                | <b>0.012</b>                                 |
| PFHXA   | UG/L  |                            | <b>0.016</b>                            | <b>0.014</b>                         | <b>0.023</b>                         | <b>0.018</b>                                    | <b>0.0071</b>                         | <b>0.0093</b>                     | <b>0.0091</b>                              | <b>0.0044</b>                                | <b>0.016</b>                                 |
| PFHXS   | UG/L  |                            | <0.0020                                 | <0.0020                              | <0.0020                              | <b>0.002</b>                                    | <b>0.002</b>                          | <0.0020                           | <0.0020                                    | <0.0020                                      | <b>0.002</b>                                 |
| PFNA  | UG/L  |                            | <b>0.0031</b>                           | <b>0.0067 J</b>                      | <b>0.0044</b>                        | <b>0.0033</b>                                   | <b>0.003</b>                          | <b>0.0023</b>                     | <b>0.0022</b>                              | <b>0.0021</b>                                | <b>0.0056</b>                                |
| PFOS  | UG/L  |                            | <b>0.0045</b>                           | <b>0.0045</b>                        | <b>0.0061</b>                        | <b>0.0049</b>                                   | <b>0.005</b>                          | <b>0.0042</b>                     | <b>0.0044</b>                              | <b>0.0042</b>                                | <b>0.0039</b>                                |
| PFOA  | UG/L  |                            | <b>0.01</b>                             | <b>0.01</b>                          | <b>0.014</b>                         | <b>0.011</b>                                    | <b>0.0097</b>                         | <b>0.0077</b>                     | <b>0.0075</b>                              | <b>0.0082</b>                                | <b>0.015</b>                                 |
| PFUNA   | UG/L  |                            | <b>0.003</b>                            | <b>0.0077 J</b>                      | <0.0020                              | <0.0020   | <0.0020                               | <0.0020                           | <0.0020                                    | <0.0020                                      | <0.0020                                      |
| PFTeDA  | UG/L  |                            | <0.0020                                 | <0.0020                              | <0.0020                              | <0.0020   | <0.0020                               | <0.0020                           | <0.0020                                    | <0.0020                                      | <0.0020                                      |
| PFTTrDA Acid                                    | UG/L  |                            | <0.0020                                 | <0.0020                              | <0.0020                              | <0.0020   | <0.0020                               | <0.0020                           | <0.0020                                    | <0.0020                                      | <0.0020                                      |
| <b>Fluorinated Alternative Chemicals</b>        |       |                            |   |                                      |                                      |   |                                       |                                   |  |  |  |
| Hfpo Dimer Acid                                 | UG/L  |                            | <0.0040                                 | <0.0040                              | <b>0.004</b>                         | <0.0040   | <0.0040                               | <0.0040                           | <0.0040                                    | <0.0040                                      | <0.0040                                      |
| ADONA   | UG/L  |                            | <0.0021                                 | <0.0021                              | <0.0021                              | <0.0021   | <0.0021                               | <0.0021                           | <0.0021                                    | <0.0021                                      | <0.0021                                      |
| F-53B Major                                     | UG/L  |                            | <0.0020                                 | <0.0020                              | <0.0020                              | <0.0020   | <0.0020                               | <0.0020                           | <0.0020                                    | <0.0020                                      | <0.0020                                      |
| F-53B Minor                                     | UG/L  |                            | <0.0020                                 | <0.0020                              | <0.0020                              | <0.0020   | <0.0020                               | <0.0020                           | <0.0020                                    | <0.0020                                      | <0.0020                                      |
| N-ethyl perfluorooctane sulfonamidoacetic acid  | UG/L  |                            | <0.020                                  | <0.020                               | <0.020                               | <0.020  | <0.020                                | <0.020                            | <0.020                                     | <0.020                                       | <0.020                                       |
| N-methyl perfluorooctane sulfonamidoacetic acid | UG/L  |                            | <0.020                                  | <0.020                               | <0.020                               | <0.020  | <0.020                                | <0.020                            | <0.020                                     | <0.020                                       | <0.020                                       |
| Total Suspended Solids                          | MG/L  |                            | <b>75</b>                               | <b>40</b>                            | <b>69</b>                            | <b>81</b>                                       | <b>37</b>                             | <b>12</b>                         | <b>28</b>                                  | <b>16</b>                                    | <4.0   |

**Notes:**

J = Reported value may not be accurate or precise.

PFBS = Perfluorobutane Sulfonic Acid

PFDA = Perfluorodecanoic Acid

PFDOA = Perfluorododecanoic Acid

PFHPA = Perfluoroheptanoic Acid

PFHXA = Perfluorohexanoic Acid

PFHXS = Perfluorohexane Sulfonic Acid

PFNA = Perfluorononanoic Acid

PFOA = Perfluorooctanoic Acid

PFOS = Perfluorooctane Sulfonic Acid

PFUNA = Perfluoroundecanoic Acid

PFTeDA = Perfluorotetradecanoic Acid

PFTTrDA = Perfluorotridecanoic Acid

**Table 1**  
**Summary of Analytical Results in Surface Water**  
**Delaware River HFPO-DA and PFAS Characterization**  
**Perfluorinated Compounds**  
**Chemours Chambers Works Complex**  
**Deepwater, New Jersey**

| Parameter Name                                  | Units | Location ID<br>Sample Date | Christina-Riv-<br>Deep<br>(RM-70.6)<br>03/28/2019 | Oldmans-<br>Point<br>(RM 74.9)<br>03/28/2019 | Oldsman-<br>Crk<br>(RM-77.5)<br>03/28/2019 | Marcus-Hook<br>(RM 78.1)<br>03/28/2019 | Bulk-Storage<br>(RM-80.5)<br>03/28/2019 | Racoon-Crk<br>(RM-80.5)<br>03/28/2019 | Repaupo-<br>Crk<br>(RM-83.0)<br>03/29/2019 | Eddystone<br>(RM-84.0)<br>03/29/2019 | Darby-Crk<br>(RM-85.1)<br>03/29/2019 |
|---|-------|----------------------------|---|--|--|--|---|---------------------------------------|--|--------------------------------------|--------------------------------------|
| <b>Perfluorinated Compounds</b>                 |       |                            |   |  |  |  |   |                                       |  |                                      |                                      |
| PFBS  | UG/L  |                            | <b>0.0021</b>                                     | <0.0020                                      | <0.0020                                    | <0.0020                                | <0.0020                                 | <0.0020                               | <0.0020                                    | <0.0020                              | <b>0.0028</b>                        |
| PFDA  | UG/L  |                            | <0.0020   | <0.0020                                      | <0.0020                                    | <0.0020                                | <0.0020                                 | <0.0020                               | <0.0020                                    | <0.0020                              | <0.0020                              |
| PFDOA   | UG/L  |                            | <0.0020   | <0.0020                                      | <0.0020                                    | <0.0020                                | <0.0020                                 | <0.0020                               | <0.0020                                    | <0.0020                              | <0.0020                              |
| PFHPA   | UG/L  |                            | <b>0.01</b>                                       | <b>0.0023</b>                                | <b>0.0044</b>                              | <b>0.0023</b>                          | <b>0.0021</b>                           | <b>0.0026</b>                         | <b>0.0021</b>                              | <b>0.0022</b>                        | <b>0.0032</b>                        |
| PFHXA   | UG/L  |                            | <b>0.013</b>                                      | <b>0.0038</b>                                | <b>0.009</b>                               | <b>0.0037</b>                          | <b>0.0033</b>                           | <b>0.0042</b>                         | <b>0.0037</b>                              | <b>0.0038</b>                        | <b>0.0055</b>                        |
| PFHXS   | UG/L  |                            | <0.0020   | <0.0020                                      | <0.0020                                    | <0.0020                                | <0.0020                                 | <0.0020                               | <0.0020                                    | <0.0020                              | <b>0.0022</b>                        |
| PFNA  | UG/L  |                            | <b>0.005</b>                                      | <b>0.0022</b>                                | <b>0.0053</b>                              | <0.0020                                | <0.0020                                 | <b>0.0025</b>                         | <b>0.0025</b>                              | <0.0020                              | <b>0.0033</b>                        |
| PFOS  | UG/L  |                            | <b>0.0042</b>                                     | <b>0.0042</b>                                | <b>0.0046</b>                              | <b>0.0041</b>                          | <b>0.004</b>                            | <b>0.0044</b>                         | <b>0.0042</b>                              | <b>0.004</b>                         | <b>0.0051</b>                        |
| PFOA  | UG/L  |                            | <b>0.013</b>                                      | <b>0.0061</b>                                | <b>0.011</b>                               | <b>0.0058</b>                          | <b>0.0051</b>                           | <b>0.0063</b>                         | <b>0.0056</b>                              | <b>0.0053</b>                        | <b>0.0075</b>                        |
| PFUNA   | UG/L  |                            | <0.0020   | <0.0020                                      | <0.0020                                    | <0.0020                                | <0.0020                                 | <0.0020                               | <0.0020                                    | <0.0020                              | <0.0020                              |
| PFTeDA  | UG/L  |                            | <0.0020   | <0.0020                                      | <0.0020                                    | <0.0020                                | <0.0020                                 | <0.0020                               | <0.0020                                    | <0.0020                              | <0.0020                              |
| PFTTrDA Acid                                    | UG/L  |                            | <0.0020   | <0.0020                                      | <0.0020                                    | <0.0020                                | <0.0020                                 | <0.0020                               | <0.0020                                    | <0.0020                              | <0.0020                              |
| <b>Fluorinated Alternative Chemicals</b>        |       |                            |   |  |  |  |   |                                       |  |                                      |                                      |
| Hfpo Dimer Acid                                 | UG/L  |                            | <0.0040   | <0.0040                                      | <0.0040                                    | <0.0040                                | <0.0040                                 | <0.0040                               | <0.0040                                    | <0.0040                              | <0.0040                              |
| ADONA   | UG/L  |                            | <0.0021   | <0.0021                                      | <0.0021                                    | <0.0021                                | <0.0021                                 | <0.0021                               | <0.0021                                    | <0.0021                              | <0.0021                              |
| F-53B Major                                     | UG/L  |                            | <0.0020   | <0.0020                                      | <0.0020                                    | <0.0020                                | <0.0020                                 | <0.0020                               | <0.0020                                    | <0.0020                              | <0.0020                              |
| F-53B Minor                                     | UG/L  |                            | <0.0020   | <0.0020                                      | <0.0020                                    | <0.0020                                | <0.0020                                 | <0.0020                               | <0.0020                                    | <0.0020                              | <0.0020                              |
| N-ethyl perfluorooctane sulfonamidoacetic acid  | UG/L  |                            | <0.020  | <0.020                                       | <0.020                                     | <0.020                                 | <0.020                                  | <0.020                                | <0.020                                     | <0.020                               | <0.020                               |
| N-methyl perfluorooctane sulfonamidoacetic acid | UG/L  |                            | <0.020  | <0.020                                       | <0.020                                     | <0.020                                 | <0.020                                  | <0.020                                | <0.020                                     | <0.020                               | <0.020                               |
| Total Suspended Solids                          | MG/L  |                            | <b>9.2</b>  | <b>7.2</b>                                   | <b>16</b>                                  | <b>5.6</b>                             | <b>10</b>                               | <b>20</b>                             | <b>18</b>                                  | <b>6.8</b>                           | <b>12</b>                            |

## Notes:

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PFBS = Perfluorobutane Sulfonic Acid

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PFDOA = Perfluorododecanoic Acid

PFHPA = Perfluoroheptanoic Acid

PFHXA = Perfluorohexanoic Acid

PFHXS = Perfluorohexane Sulfonic Acid

PFNA = Perfluorononanoic Acid

PFOA = Perflurooctanoic Acid

PFOS = Perfluorooctane Sulfonic Acid

PFUNA = Perfluoroundecanoic Acid

PFTeDA = Perfluorotetradecanoic Acid

PFTTrDA = Perfluorotridecanoic Acid

**Table 1**  
**Summary of Analytical Results in Surface Water**  
**Delaware River HFPO-DA and PFAS Characterization**  
**Perfluorinated Compounds**  
**Chemours Chambers Works Complex**  
**Deepwater, New Jersey**

| Parameter Name                                  | Units | Location ID<br>Sample Date | Paulsboro<br>(RM-87.9)<br>03/29/2019 | Mantua-Crk<br>(RM-89.7)<br>03/29/2019 | Thorofare<br>(RM-89.7)<br>03/29/2019 | Schuylkill<br>(RM-92.4)<br>03/29/2019 | Navy-Yard<br>(RM-93.2)<br>03/29/2019 | Big-Timber-<br>Crk<br>(RM-95.2)<br>03/29/2019 |
|---|-------|----------------------------|--------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|---|
| <b>Perfluorinated Compounds</b>                 |       |                            |                                      |                                       |                                      |                                       |                                      |   |
| PFBS  | UG/L  |                            | <0.0020                              | <b>0.0022</b>                         | <b>0.002</b>                         | <b>0.0027</b>                         | <0.0020                              | <0.0020                                       |
| PFDA  | UG/L  |                            | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                                       |
| PFDOA   | UG/L  |                            | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                                       |
| PFHPA   | UG/L  |                            | <0.0020                              | <b>0.0022</b>                         | <b>0.0022</b>                        | <b>0.0022</b>                         | <0.0020                              | <0.0020                                       |
| PFHXA   | UG/L  |                            | <b>0.0033</b>                        | <b>0.0037</b>                         | <b>0.0036</b>                        | <b>0.0037</b>                         | <b>0.0027</b>                        | <b>0.0025</b>                                 |
| PFHXS   | UG/L  |                            | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                                       |
| PFNA  | UG/L  |                            | <0.0020                              | <b>0.0072</b>                         | <b>0.0034</b>                        | <0.0020                               | <0.0020                              | <0.0020                                       |
| PFOS  | UG/L  |                            | <b>0.0038</b>                        | <b>0.0042</b>                         | <b>0.0055</b>                        | <b>0.0035</b>                         | <b>0.0037</b>                        | <b>0.0029</b>                                 |
| PFOA  | UG/L  |                            | <b>0.0049</b>                        | <b>0.0059</b>                         | <b>0.0059</b>                        | <b>0.0054</b>                         | <b>0.0041</b>                        | <b>0.0035</b>                                 |
| PFUNA   | UG/L  |                            | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                                       |
| PFTeDA  | UG/L  |                            | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                                       |
| PFTrDA Acid                                     | UG/L  |                            | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                                       |
| <b>Fluorinated Alternative Chemicals</b>        |       |                            |                                      |                                       |                                      |                                       |                                      |   |
| Hfpo Dimer Acid                                 | UG/L  |                            | <0.0040                              | <0.0040                               | <0.0040                              | <0.0040                               | <0.0040                              | <0.0040                                       |
| ADONA   | UG/L  |                            | <0.0021                              | <0.0021                               | <0.0021                              | <0.0021                               | <0.0021                              | <0.0021                                       |
| F-53B Major                                     | UG/L  |                            | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                                       |
| F-53B Minor                                     | UG/L  |                            | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                               | <0.0020                              | <0.0020                                       |
| N-ethyl perfluorooctane sulfonamidoacetic acid  | UG/L  |                            | <0.020                               | <0.020                                | <0.020                               | <0.020                                | <0.020                               | <0.020  |
| N-methyl perfluorooctane sulfonamidoacetic acid | UG/L  |                            | <0.020                               | <0.020                                | <0.020                               | <0.020                                | <0.020                               | <0.020  |
| Total Suspended Solids                          | MG/L  |                            | <b>13</b>                            | <b>5.2</b>                            | <b>6.4</b>                           | <b>14.0 J</b>                         | <b>7.2</b>                           | <b>4</b>                                      |

**Notes:**

J = Reported value may not be accurate or precise.

PFBS = Perfluorobutane Sulfonic Acid

PFDA = Perfluorodecanoic Acid

PFDOA = Perfluorododecanoic Acid

PFHPA = Perfluoroheptanoic Acid

PFHXA = Perfluorohexanoic Acid

PFHXS = Perfluorohexane Sulfonic Acid

PFNA = Perfluorononanoic Acid

PFOA = Perfluorooctanoic Acid

PFOS = Perfluorooctane Sulfonic Acid

PFUNA = Perfluoroundecanoic Acid

PFTeDA = Perfluorotetradecanoic Acid

PFTrDA = Perfluorotridecanoic Acid

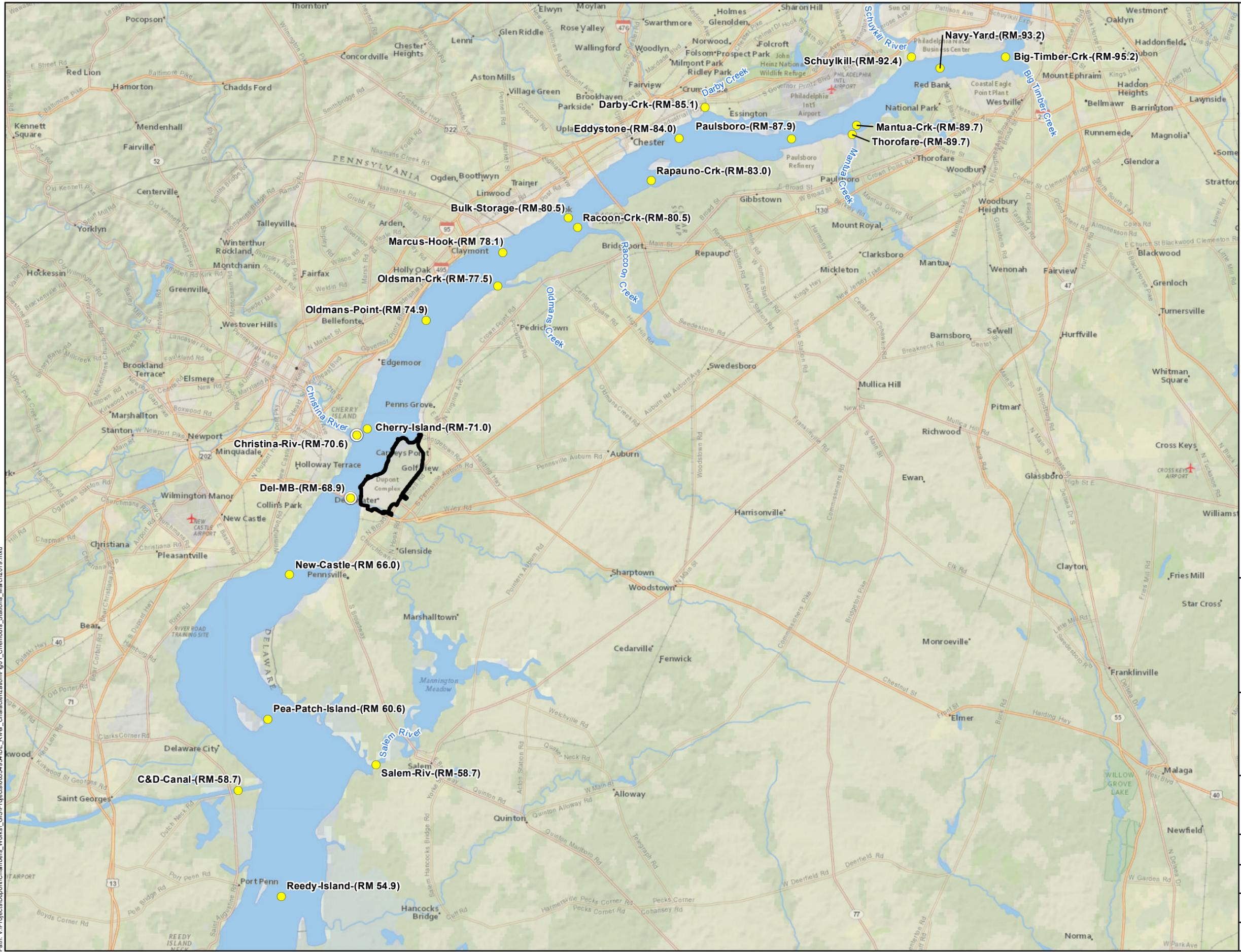
**Table 2**  
**Summary of Field Parameters During Surface-Water Sampling**  
**Delaware River HFPO-DA and PFAS Characterization**  
**Chemours Chambers Works Complex**  
**Deepwater, New Jersey**

| Location ID                | Date Sampled | Time Sampled | Field Filtered | Surface Water Depth | Temperature (°C) | pH   | Dissolved Oxygen | DO Saturation | ReDOX (mV) | mS/cm | Turbidity (NTU) |
|----------------------------|--------------|--------------|----------------|---------------------|------------------|------|------------------|---------------|------------|-------|-----------------|
| Reedy-Island-(RM 54.9)     | 3/27/19      | 9:55         | N              | 1.5                 | 7.74             | 6.71 | 10.97            | 92            | 136        | 0.895 | 68.7            |
| Reedy-Island-(RM 54.9)     | 3/27/19      | 9:55         | N              | 25                  | 7.74             | 6.81 | 10.92            | 91.6          | 133        | 0.899 | 83.7            |
| Reedy-Island-(RM 54.9)     | 3/27/19      | 9:55         | N              | 40                  | 7.74             | 6.88 | 10.89            | 91.4          | 131.7      | 0.893 | 89.1            |
| (C&D-Canal-(RM-58.7)       | 3/27/19      | 10:35        | N              | 1.5                 | 7.63             | 7.19 | 11.44            | 96.1          | 138.2      | 0.709 | 27.6            |
| (C&D-Canal-(RM-58.7)       | 3/27/19      | 10:35        | N              | 20                  | 7.16             | 7.16 | 11.26            | 94.2          | 128.6      | 0.758 | 29.4            |
| (C&D-Canal-(RM-58.7)       | 3/27/19      | 10:35        | N              | 35                  | 7.17             | 7.17 | 11.2             | 93.6          | 128.6      | 0.79  | 32.2            |
| Salem-Riv-(RM-58.7)        | 3/27/19      | 11:05        | N              | 1.5                 | 7.44             | 7.46 | 11.35            | 94.8          | 143.1      | 0.572 | 63.5            |
| Salem-Riv-(RM-58.7)        | 3/27/19      | 11:05        | N              | 6                   | 7.43             | 7.42 | 11.17            | 93.1          | 132.7      | 0.572 | 61.3            |
| Salem-Riv-(RM-58.7)        | 3/27/19      | 11:05        | N              | 10                  | 7.76             | 7.43 | 11.35            | 94.5          | 130.2      | 0.569 | 60.2            |
| Pea-Patch-Island-(RM 60.6) | 3/27/19      | 12:05        | N              | 1.5                 | 7.96             | 7.61 | 12.89            | 108.7         | 122.3      | 0.368 | 26              |
| Pea-Patch-Island-(RM 60.6) | 3/27/19      | 12:05        | N              | 20                  | 7.94             | 7.48 | 11.44            | 96.6          | 119.6      | 0.369 | 36.4            |
| Pea-Patch-Island-(RM 60.6) | 3/27/19      | 12:05        | N              | 40                  | 7.94             | 7.46 | 11.32            | 95.5          | 120.9      | 0.371 | 41.3            |
| New-Castle-(RM 66.0)       | 3/27/19      | 12:35        | N              | 1.5                 | 8.27             | 7.46 | 11.12            | 94.6          | 131.8      | 0.345 | 20.3            |
| New-Castle-(RM 66.0)       | 3/27/19      | 12:35        | N              | 10                  | 8.25             | 7.44 | 11.02            | 93.6          | 131.6      | 0.345 | 30              |
| New-Castle-(RM 66.0)       | 3/27/19      | 12:35        | N              | 20                  | 8.22             | 7.43 | 10.95            | 92.9          | 132.7      | 0.344 | 46.4            |
| Cherry-Island-(RM-71.0)    | 3/27/19      | 12:50        | N              | 1.5                 | 8.29             | 7.48 | 10.93            | 93.1          | 153.8      | 0.309 | 8.9             |
| Cherry-Island-(RM-71.0)    | 3/27/19      | 12:50        | N              | 25                  | 8.2              | 7.43 | 10.73            | 91.1          | 153.2      | 0.311 | 19.1            |
| Cherry-Island-(RM-71.0)    | 3/27/19      | 12:50        | N              | 45                  | 8.2              | 7.4  | 10.68            | 90.6          | 152.9      | 0.311 | 26.4            |
| Del-MB-(RM-68.9)           | 3/28/2019    | 12:00        | N              | 1.5                 | 8.32             | 7.7  | 10.55            | 90.2          | 180.2      | 0.267 | 15              |
| Del-MB-(RM-68.9)           | 3/28/2019    | 12:00        | N              | 20                  | 8.28             | 7.68 | 10.25            | 81.2          | 172.3      | 0.267 | 20.3            |
| Del-MB-(RM-68.9)           | 3/28/2019    | 12:00        | N              | 40                  | 8.26             | 7.68 | 10.45            | 88.9          | 173.8      | 0.268 | 28              |
| Christina-Riv-(RM-70.6)    | 3/28/2019    | 13:15        | N              | 1.5                 | 8.8              | 7.9  | 10.85            | 93.7          | 193.8      | 0.286 | 5.6             |
| Christina-Riv-(RM-70.6)    | 3/28/2019    | 13:15        | N              | 21                  | 8.64             | 7.74 | 10.25            | 87.9          | 171        | 0.286 | 6.5             |
| Christina-Riv-(RM-70.6)    | 3/28/2019    | 13:15        | N              | 35                  | 8.43             | 7.72 | 10.21            | 87.2          | 176.5      | 0.285 | 9.2             |
| Oldmans-Point-(RM 74.9)    | 3/28/2019    | 13:40        | N              | 1.5                 | 8.04             | 7.67 | 10.52            | 89            | 157.3      | 0.234 | 9.9             |
| Oldmans-Point-(RM 74.9)    | 3/28/2019    | 13:40        | N              | 22                  | 7.96             | 7.66 | 10.52            | 88.8          | 161.9      | 0.235 | 24.1            |
| Oldmans-Point-(RM 74.9)    | 3/28/2019    | 13:40        | N              | 43                  | 7.96             | 7.65 | 10.62            | 88.8          | 167.5      | 0.236 | 42.1            |
| Oldmans-Crk-(RM-77.5)      | 3/28/2019    | 14:10        | N              | 1                   | 8.99             | 7.77 | 11.01            | 95.3          | 176.4      | 0.264 | 14.4            |
| Oldmans-Crk-(RM-77.5)      | 3/28/2019    | 14:10        | N              | 2                   | 8.98             | 7.76 | 11.02            | 95.3          | 171.8      | 0.264 | 17.8            |
| Oldmans-Crk-(RM-77.5)      | 3/28/2019    | 14:10        | N              | 3                   | 9.08             | 7.75 | 10.98            | 95.4          | 166.2      | 0.263 | 17.3            |
| Marcus-Hook-(RM 78.1)      | 3/28/2019    | 14:30        | N              | 1.5                 | 8.03             | 7.66 | 10.55            | 89            | 175        | 0.234 | 6.6             |
| Marcus-Hook-(RM 78.1)      | 3/28/2019    | 14:30        | N              | 20                  | 7.94             | 7.67 | 10.54            | 88.9          | 182.4      | 0.235 | 10.2            |
| Marcus-Hook-(RM 78.1)      | 3/28/2019    | 14:30        | N              | 40                  | 7.93             | 7.71 | 10.59            | 89.5          | 191.4      | 0.234 | 13.6            |
| Racoon-Crk-(RM-83.0)       | 3/28/2019    | 14:50        | N              | 1                   | 10.11            | 7.88 | 10.77            | 95.7          | 193.1      | 0.238 | 19.6            |
| Racoon-Crk-(RM-83.0)       | 3/28/2019    | 14:50        | N              | 2                   | 10.01            | 7.84 | 10.86            | 96.4          | 182.2      | 0.238 | 21.3            |
| Racoon-Crk-(RM-83.0)       | 3/28/2019    | 14:50        | N              | 4                   | 10.08            | 7.85 | 10.86            | 96.4          | 186.3      | 0.239 | 20.2            |
| Bulk-Storage-(RM-80.5)     | 3/28/2019    | 15:00        | N              | 1.5                 | 7.92             | 7.68 | 10.59            | 89.2          | 177.2      | 0.225 | 8.6             |

**Table 2**  
**Summary of Field Parameters During Surface-Water Sampling**  
**Delaware River HFPO-DA and PFAS Characterization**  
**Chemours Chambers Works Complex**  
**Deepwater, New Jersey**

| Location ID              | Date Sampled | Time Sampled | Field Filtered | Surface Water Depth | Temperature (°C) | pH   | Dissolved Oxygen | DO Saturation | ReDOX (mV) | mS/cm | Turbidity (NTU) |
|--------------------------|--------------|--------------|----------------|---------------------|------------------|------|------------------|---------------|------------|-------|-----------------|
| Bulk-Storage-(RM-80.5)   | 3/28/2019    | 15:00        | N              | 20                  | 7.85             | 7.86 | 10.57            | 89            | 180.9      | 0.225 | 11.7            |
| Bulk-Storage-(RM-80.5)   | 3/28/2019    | 15:00        | N              | 41                  | 7.85             | 7.69 | 10.58            | 89            | 185.1      | 0.225 | 13.2            |
| Repauno-Crk-(RM-83.0)    | 3/29/2019    | 12:35        | N              | 1                   | 8.21             | 7.58 | 11.91            | 101.1         | 184.3      | 0.249 | 9.9             |
| Repauno-Crk-(RM-83.0)    | 3/29/2019    | 12:35        | N              | 5                   | 8.21             | 7.55 | 11.94            | 101.5         | 185        | 0.249 | 14.3            |
| Repauno-Crk-(RM-83.0)    | 3/29/2019    | 12:35        | N              | 10                  | 8.21             | 7.78 | 12.06            | 102.6         | 185.5      | 0.249 | 14.2            |
| Eddystone-(RM-84.0)      | 3/29/2019    | 12:50        | N              | 1                   | 8.09             | 7.64 | 11.85            | 100.4         | 198.9      | 0.246 | 10              |
| Eddystone-(RM-84.0)      | 3/29/2019    | 12:50        | N              | 22                  | 8.09             | 7.65 | 11.87            | 100.5         | 201.5      | 0.246 | 9.2             |
| Eddystone-(RM-84.0)      | 3/29/2019    | 12:50        | N              | 47                  | 8.09             | 7.67 | 11.94            | 101.1         | 209.2      | 0.246 | 11.5            |
| Darby-Crk-(RM-85.1)      | 3/29/2019    | 13:15        | N              | 1                   | 9.17             | 7.6  | 11.38            | 98.9          | 175.3      | 0.324 | 8.2             |
| Darby-Crk-(RM-85.1)      | 3/29/2019    | 13:15        | N              | 6                   | 9.18             | 7.61 | 11.36            | 98.8          | 184        | 0.326 | 8.3             |
| Darby-Crk-(RM-85.1)      | 3/29/2019    | 13:15        | N              | 12                  | 9.16             | 7.61 | 11.49            | 100           | 194.3      | 0.324 | 9.5             |
| Paulsboro-(RM-87.9)      | 3/29/2019    | 13:30        | N              | 1                   | 7.9              | 7.68 | 12.12            | 102.2         | 208.8      | 0.248 | 9.2             |
| Paulsboro-(RM-87.9)      | 3/29/2019    | 13:30        | N              | 22                  | 7.89             | 7.66 | 12.09            | 101.9         | 204        | 0.246 | 11.1            |
| Paulsboro-(RM-87.9)      | 3/29/2019    | 13:30        | N              | 40                  | 7.89             | 7.66 | 12.07            | 101.8         | 202        | 0.245 | 10.5            |
| Thorofare-(RM-89.7)      | 3/29/2019    | 13:50        | N              | 1                   | 8.57             | 7.67 | 12.23            | 104.8         | 211.7      | 0.234 | 7               |
| Thorofare-(RM-89.7)      | 3/29/2019    | 13:50        | N              | 10                  | 8.56             | 7.68 | 12.3             | 105.4         | 214.7      | 0.234 | 8.5             |
| Thorofare-(RM-89.7)      | 3/29/2019    | 13:50        | N              | 20                  | 6.56             | 7.7  | 12.65            | 108.3         | 219.1      | 0.234 | 10.2            |
| Mantua-Crk-(RM-89.7)     | 3/29/2019    | 14:00        | N              | 1                   | 8.2              | 7.65 | 12.15            | 103.3         | 215.7      | 0.236 | 6               |
| Mantua-Crk-(RM-89.7)     | 3/29/2019    | 14:00        | N              | 10                  | 7.92             | 7.66 | 12.22            | 103.1         | 218.3      | 0.231 | 5.6             |
| Mantua-Crk-(RM-89.7)     | 3/29/2019    | 14:00        | N              | 23                  | 7.88             | 7.7  | 12.36            | 104.2         | 223.3      | 0.23  | 5.7             |
| Schuylkill-(RM-92.4)     | 3/29/2019    | 14:25        | N              | 1                   | 8.81             | 7.99 | 13               | 112           | 211.3      | 0.321 | 4.4             |
| Schuylkill-(RM-92.4)     | 3/29/2019    | 14:25        | N              | 15                  | 8.97             | 7.98 | 13.02            | 112.1         | 212.6      | 0.321 | 4.4             |
| Schuylkill-(RM-92.4)     | 3/29/2019    | 14:25        | N              | 32                  | 8.77             | 7.97 | 13.06            | 112.4         | 214.4      | 0.321 | 4.7             |
| Navy-Yard-(RM-93.2)      | 3/29/2019    | 14:50        | N              | 1                   | 7.47             | 7.65 | 12.89            | 107.5         | 213.3      | 0.202 | 4.1             |
| Navy-Yard-(RM-93.2)      | 3/29/2019    | 14:50        | N              | 26                  | 7.46             | 7.68 | 12.94            | 107.9         | 216.6      | 0.203 | 6.6             |
| Navy-Yard-(RM-93.2)      | 3/29/2019    | 14:50        | N              | 45                  | 7.47             | 7.79 | 13.18            | 110.2         | 221        | 0.203 | 5.6             |
| Big-Timber-Crk-(RM-95.2) | 3/29/2019    | 15:00        | N              | 1                   | 7.4              | 7.62 | 13.85            | 108.5         | 222.2      | 0.18  | 3.2             |
| Big-Timber-Crk-(RM-95.2) | 3/29/2019    | 15:00        | N              | 22                  | 7.36             | 7.63 | 13.07            | 108.7         | 22.5       | 0.188 | 4.1             |
| Big-Timber-Crk-(RM-95.2) | 3/29/2019    | 15:00        | N              | 44                  | 7.36             | 7.68 | 13.27            | 110.5         | 229.5      | 0.187 | 5.4             |

## Figures



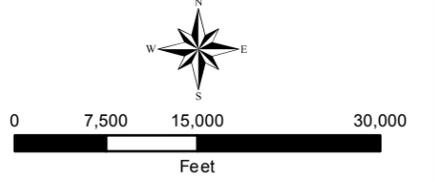
- LEGEND**
- CHEMOURS MARCH 2019 STATION
  - CHEMOURS MARCH 2019 SURFACE/DEPTH STATION
  - CHEMOURS CHAMBERS WORKS SITE

Notes:

Delaware River stations were sampled over a three day period from March 27-29, 2019.

Map Projection: NAD83 NJ State Plane feet

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MAP FORMATTED FOR 'B' (11" X 17") SIZE SHEET. TEXT SCALE NOT VALID FOR DIFFERENT PAGE SIZE.



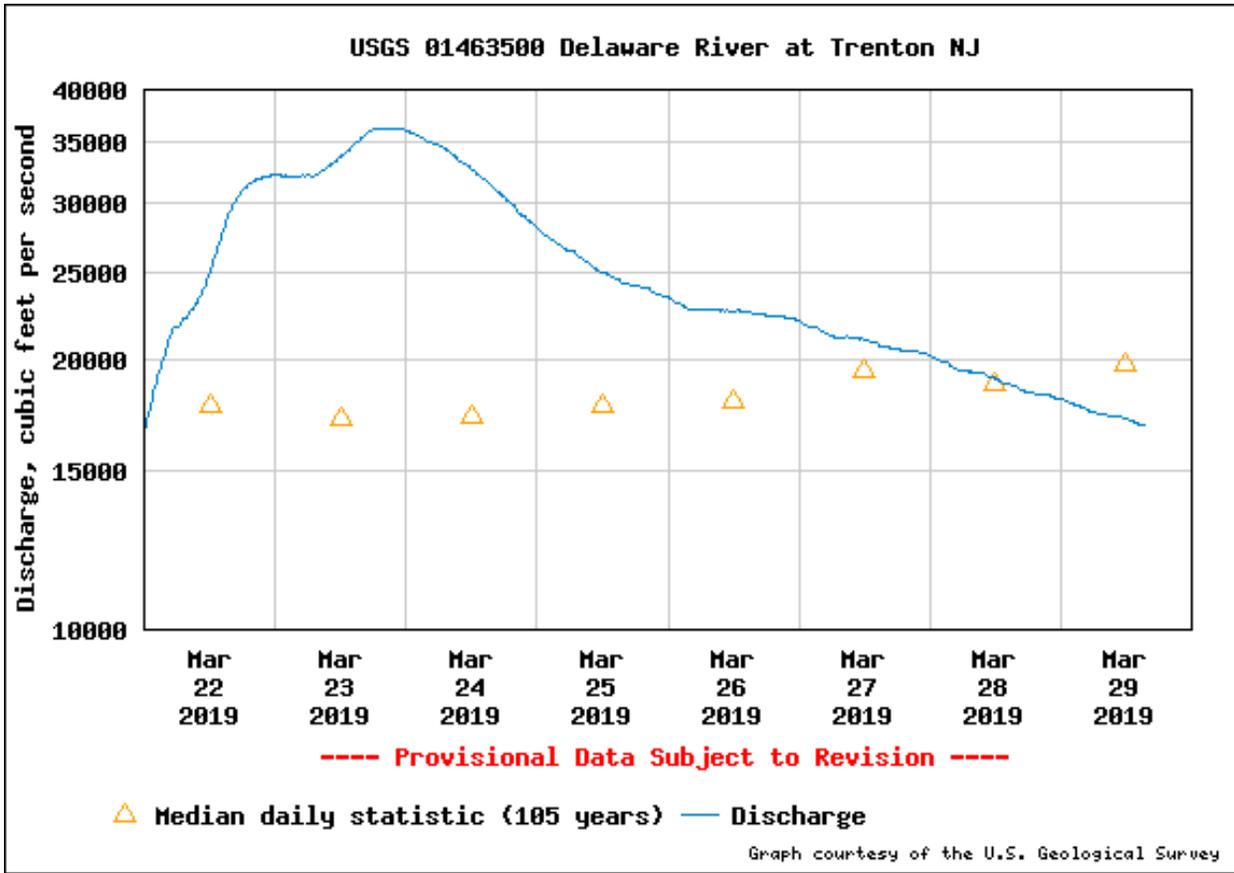
AECOM  
 Sabre Building, Suite 300  
 4051 Ogletown Road  
 Newark, DE 19713

**DELAWARE RIVER PFAS CHARACTERIZATION SAMPLING LOCATION MAP**

**CHEMOURS CHAMBERS WORKS COMPLEX DEEPWATER, NEW JERSEY**

|                        |            |                 |           |
|------------------------|------------|-----------------|-----------|
| TASK NUMBER:           | 18001      | PROJECT NUMBER: | 60585876  |
| DESIGNED BY:           | J. COLLINS | DATE:           | 4/25/2019 |
| DRAWN BY:              | M. LAYTON  | FIGURE NUMBER:  | 1         |
| DATA QUALITY CHECK BY: | K. WEST    |                 |           |

Path: V:\Projects\Dupont\Chambers\_Works\_GIS\Projects\0654934\DE\_River\_Characterization\Fig01\_Chemours\_Stations\_March2019.mxd



DESIGNED BY:  
J. COLLINS

DRAWN BY:  
J. COLLINS

DATA QUALITY CHKD:  
K. WEST

APPROVED BY:  
K. WEST



Sabre Building, Suite 300  
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Newark, Delaware 19713  
Phone: 302-781-5900

USGS GAGE 01463500  
DELAWARE RIVER FLOWS  
TRENTON, NJ

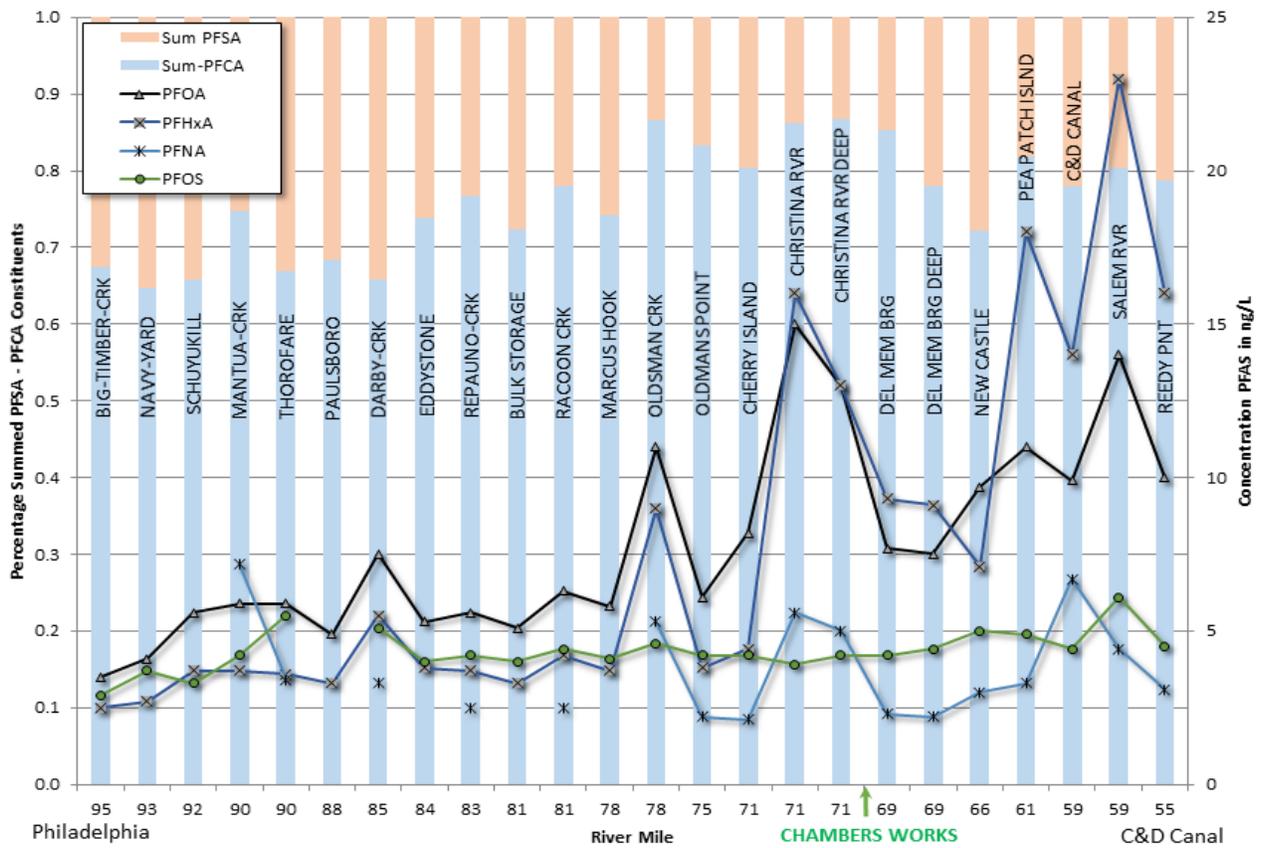
DELAWARE RIVER HFPO-DA/PFAS  
CHARACTERIZATION  
CHEMOURS CHAMBERS WORKS  
DEEPWATER, NEW JERSEY

PROJECT NO.  
60595145

DATE  
6/13/2019

FIGURE No:

2



DESIGNED BY:  
S. MORGAN

DRAWN BY:  
J. COLLINS

DATA QUALITY CHKD:  
K. WEST

APPROVED BY:  
K. WEST



Sabre Building, Suite 300  
4051 Ogletown Road  
Newark, Delaware 19713  
Phone: 302-781-5900

### Summary of Detected PFAS Compounds in Surface Water

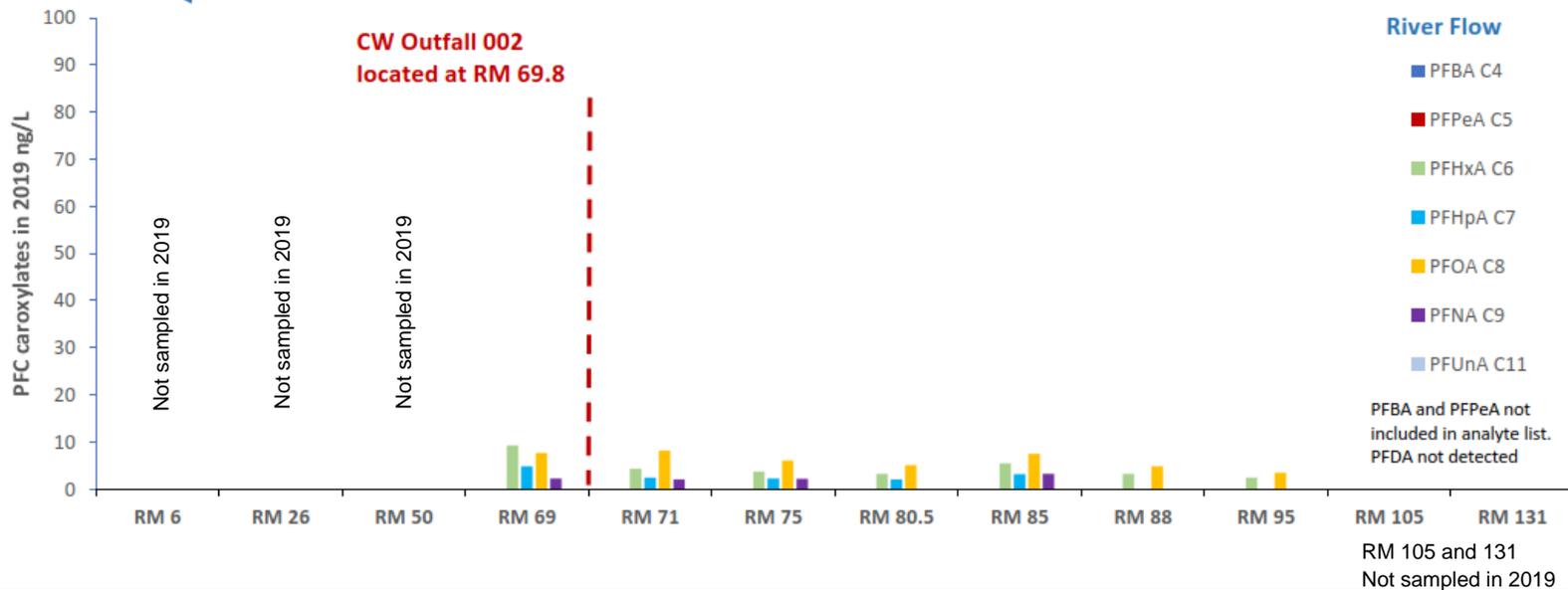
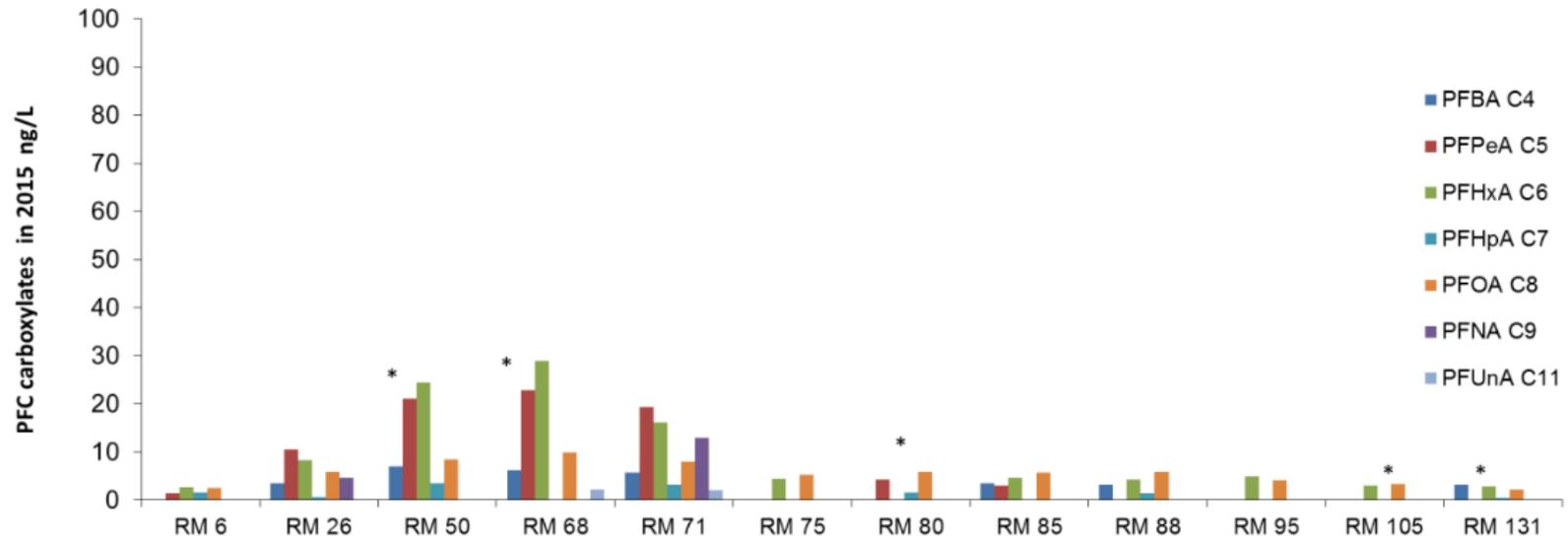
DELAWARE RIVER HFPO-DA/PFAS CHARACTERIZATION  
CHEMOURS CHAMBERS WORKS DEEPWATER, NEW JERSEY

PROJECT NO.  
60595145

DATE  
6/13/2019

FIGURE No:

3



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From: Contaminants of Emerging Concern in the Delaware River Basin  
 Ron MacGillivray, Ph.D. Senior Environmental Toxicologist  
 CCNJ Spring Conference May 3, 2016  
 \* Maximum data exceeds the maximum value of the axis

TASK NUMBER: 3  
 DESIGNED BY: S.MORGAN  
 DRAWN BY: M.LAYTON  
 DATA QUALITY CHECK BY: S.MORGAN



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 Newark, DE 19713

### COMPARISON OF PFAS DATA - 2015 TO 2019

2019 DELAWARE RIVER PFAS CHARACTERIZATION  
 CHEMOURS CHAMBERS WORKS SITE  
 DEEPWATER, NEW JERSEY

PROJECT NUMBER: 60595145

DATE: 6/25/2019

FIGURE NUMBER:

4